FAST FOURIER TRANSFORMING APPARATUS AND METHOD THEREOF FOR COMPENSATING FOR OFDM OUTPUT BIT SIGNAL

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a Fast Fourier Transforming apparatus and method thereof for restoring a received OFDM-modulated signal to an original signal, and more particularly, to a Fast Fourier Transforming apparatus and method thereof for compensating for OFDM output bit signal, thereby outputting an amount of data which is the same as the amount of input data.

2. Description of the Related Art

An OFDM (Orthogonal Frequency Division Multiplexing) is adopted for modulation method, by which data inputted serially along the time axis is transformed to parallel data, transformed back to the serial data by IFFT (Inverse Fast Fourier Transform) and then transferred to a receiving end.

At the receiving end of the OFDM modulation signal, input data is converted to a digital signal. Such converted signal is restored to the original signal by a FFT (Fast Fourier Transform) at the predetermined unit length.

Here, in a FFT apparatus (not shown) that performs FFT, a butterfly operation unit is inserted for performing a butterfly operation according to a radix algorithm.

The butterfly operation can perform forward and inverse butterfly operations according to the radix algorithm. That is, a cross operation of a positive and a negative operation is performed. The input signal undergoes the butterfly operation repeatedly according to the predetermined number of stages **n** that are required for performing the butterfly operation on the input signal by the following arithmetic expression:

$$n = \log\frac{N}{2} \qquad (1)$$

N is the number of points that are required for performing the butterfly operation on the input bit signal.

Since an input signal to the butterfly operation unit is amplified to an extent of $\sqrt{2}$ times at each stage, a signal calculated and outputted from the butterfly operation unit becomes greater than the input signal. To restore the original amplitude of the input signal, a bit signal having the same bit value as that of a signal input to the butterfly operation unit has to be generated by the FFT apparatus.

FIGS. 1A to 1B are flowcharts for showing the steps of compensating for OFDM output bit signal by the conventional method.

FIG. 1A shows a value, which is calculated by the butterfly operation, and divided by $\sqrt{2}$ at the end of each stage, in order to compensate for the

amplification of the output signal (Steps S11 through S20). According to this method, since dividing by $\sqrt{2}$ is performed at the end of every stage, the calculated amount is increased as the number of the stages is increased. Further, since the fixed operation is performed without considering errors in the input signal, a problem arises in that more error occurs as the number of stages increases.

As shown in FIG. 1B, after the butterfly operation is performed on the input signal as many times as the predetermined number of stages **n**, the signal is divided by $\sqrt{n}$ to compensate for the amplification that occurred (Steps S21 through S27).However, the fixed operation is performed without considering some errors contained in the input signal, and accordingly, the error increases as the number of stages increases.

SUMMARY OF THE INVENTION

The present invention has been made to overcome the above-mentioned problems of the related art, and accordingly, it is an object of the present invention to provide a Fast Fourier Transform apparatus and a method thereof for compensating an OFDM output bit signal, capable of controlling a Fourier-transforming of a bit value input to an input end of a FFT apparatus within a predetermined range.

The above object is accomplished by a FFT apparatus for compensating an OFDM output bit signal according to the present invention, including an input buffer unit for storing an OFDM bit signal , a butterfly